REMARKS

Summary of Amendments

Claims 1, 3 through 6, 8 and 10 through 21 are pending in this application. Claims 2, 7 and 9 have been canceled. Independent claims 1 and 6 have been amended to include a limitation on the magneto-optical section (formerly "part") and dielectric multi-layer films recited correspondingly in both claims. Then dependent claims 3, 5, 8, 10 and 13 have been amended by slight editorial changes necessitated by the amendments to independent claims 1 and 6. Claim 10 has also been amended, as has claim 4, as required by the Examiner to correct the informality pointed out in the Office action.

Claim Objections

Claims 4 and 10 were objected to for reciting "silicon oxide" and "titanium oxide" as though each were a single substance as such. Claims 4 and 10 have been amended as suggested by the Examiner, and now respectively recite *an oxide of* silicon, and *an oxide of* titanium.

Claim Rejections - 35 U.S.C. § 112

Claim 9 was rejected as being directed to subject matter non enabled by the present specification. Applicants acquiesces in this rejection, and by the present Amendment has canceled claim 9.

Claim Rejections - 35 U.S.C. § 102

Claims 1, 2 and 5; Tokyo Inst. of Tech. (JP 2000-162566 A)

Claims 1, 2 and 5 were rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Pat. App. No. Pub. 2000-162566 in the name of the Tokyo Institute of Technology.

The Tokyo Inst. of Tech. reference discloses a magneto-optical-effect amplifying element configuration in which two dielectric films differing in refractive index are stacked in multi-layers on either side of a ferrite film. Nevertheless, Tokyo Inst. of Tech. teaches that this *structure* is "in principle" prior art (paragraph 0015). The claimed invention in the Tokyo Inst. of Tech. application has to do with the *process* of manufacturing the magneto-optical effect amplifying element—i.e., at lower temperatures than in the prior art, so as to achieve increased magneto-optical effectiveness—and not the *structure* of the magneto-optical effect amplifying element.

To distinguish the present invention as claimed over the configuration disclosed as prior art in the Tokyo Inst. of Tech. reference, claim 1 has been amended to recite

> a magneto-optical *section into which at least one dielectric layer is interlaminated to create at least two magneto-optical parts* for rotating the polarization plane of incident light *of at least two wavelengths,*
>
> and to recite
>
> dielectric multi-layer films in which a low refractive-index layer and a high refractive-index layer are laminated in alternation, disposed on either side of said magneto-optical section *in an arrangement predetermined to create a resonant structure for localizing within said magneto-optical section incident light of at least two wavelengths.*

Paragraphs 0055 and 0056 of the present specification describe the principles that are the basis for the limitations added as noted above to claim 1 by the present Amendment. Paragraphs 0068 through 0079, with reference to Figs. 4 through 7, describe "interlaminating dielectric layers into the magneto-optical part" to localize plural incident beams of given wavelengths so that the Faraday rotator thus constituted acts to selectively rotate only the polarization planes of incident light of the given wavelengths.

It is respectfully submitted that Japanese Pat. App. No. Pub. 2000-162566 nowhere discloses a configuration for a Faraday rotator as now recited in claim 1, namely a configuration that localizes within a magneto-optical section incident light of at least two wavelengths, wherein the magneto-optical section rotates the polarization plane of incident light of at least two wavelengths.

For the foregoing reasons, it is believed that claim 1 should be held allowable, and accordingly that claim 5 should be held allowable as depending from an allowable base claim. (Claim 2 has been canceled as having been rendered unnecessary by the amendments to claim 1.)

Claims 1, 2, 4-7, 10 and 13; Ricoh (JP 11-030770 A)

Claims 1, 2, 4 through 7, 10 and 13 stand rejected, again under 35 U.S.C. § 102(b), as being anticipated by Japanese Pat. App. No. Pub. H11-030770 in the name of Ricoh Co., Ltd. The Ricoh reference has been cited for reasons similar to why the Tokyo Inst. of Tech. reference discussed above was cited. But in addition, the Ricoh reference has been cited to reject the optical isolator as recited in claim 6, which includes the elements of the Faraday rotator set forth in claim 1.

Although the Ricoh reference discloses a magnetic layer sandwiched in between multi-layer stacks of two dielectric films differing in refractive index, from paragraph 0013 it would seem crucial that the magnetic layer is transparent. This is to achieve a large Faraday rotation angle in, and enlarged surface area of, a magneto-optical element suitable for

application in displays (paragraph 0011). This in the first place teaches away from the miniaturization that is a stated object of the present invention.

On page 5 of the present Office action, the Examiner notes

> The recitation of the rotator as selectively rotat[ing] the polarization plane of incident light only of given wavelengths is functional, and describes the rotator in terms of *what it does* rather than *what it is*. That is, this recitation is not seen as imparting any positive structural limitation to the claimed structure as would distinguish over the structure of Ricoh. [Emphasis in original.]

As has claim 1, claim 6 has been amended to recite

> a magneto-optical *section into which at least one dielectric layer is interlaminated to create at least two magneto-optical parts* for rotating the polarization plane of incident light *of at least two wavelengths*,

and to recite

> dielectric multi-layer films in which a low refractive-index layer and a high refractive-index layer are laminated in alternation, disposed on either side of said magneto-optical section *in an arrangement predetermined to create a resonant structure for localizing within said magneto-optical section incident light of at least two wavelengths*.

It is respectfully submitted that claims 1 and 6 as amended recite positive structural limitations that distinguish the present invention over the configuration disclosed in Ricoh.

In particular, it is respectfully submitted that Japanese Pat. App. No. Pub. H11-030770 nowhere discloses a configuration for a Faraday rotator as now recited in claim 1 and as a constituent of the optical isolator recited in claim 6, namely a configuration that localizes within a magneto-optical section incident light of at least two wavelengths, wherein the magneto-optical section rotates the polarization plane of incident light of at least two wavelengths.

For the foregoing reasons, it is believed that claims 1 and 6 should be held allowable, and accordingly that claims 4 and 5 as depending from an allowable base claim 1 should no longer stand rejected over the Ricoh reference, and that claims 10 and 13 as depending from an allowable base claim 6 should likewise no longer stand rejected. (Claim 7 has been canceled as having been rendered unnecessary by the amendments to claim 1.)

Claims 1, 2, 5, 6, 7 and 13; Matsushita et al. (2002/0063941A1)

Claims 1, 2, 5, 6, 7 and 13 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. App. Pub. No. 2002/0063941 A1 by Matsushita et al.

This Matsushita et al. reference appears to have been cited with regard to claim 1 in the present application for disclosing a configuration of a "magneto-optical member" (10A), also referred to therein as a "45-degree Faraday rotator," and with regard to claim 6, a configuration of an optical isolator (1A), illustrated in Fig. 6 in the reference, that comprises the Faraday rotator (10A).

The optical isolator of Fig. 6 in the Matsushita et al. reference comprises the characteristic permanent magnet around, and the polarizer-analyzer pair flanking the ends of, a Faraday rotator. This optical isolator configuration is illustrated as prior art in Fig. 7 of Matsushita et al. The gist of the technical disclosure in the Matsushita et al. reference is configuring the magneto-optical member/Faraday rotator (10A) to have enhanced "light transmittance."

Prior to describing the configuration of the Faraday rotator that according the Matsushita et al. reference achieves enhanced light transmittance, a structure described as a Fabry-Perot resonator and comprising dielectric multilayer films arranged on either side of a magneto-optical thin film is discussed as prior art (paragraphs 0012 and 0013) and illustrated as such (Fig. 9). The periodic dielectric multilayer films are described in paragraph 0015 as "play[ing][the] part of the reflecting mirror of the Fabry-Perot resonator." Therefore, that structure itself is not the key to the invention disclosed in the Matsushita et al. reference. The Office action mentions this structure as being shown in Fig. 1 in Matsushita et al., but illustrated in Fig. 1, as distinct from Fig. 9, are two Fabry-Perot resonators, between which a dielectric thin film (23) is sandwiched. This configuration, described in paragraph 0056 as a cascaded connection, achieves the increase in light transmittance that is the stated object of the invention in Matsushita et al.

Although on page 6 of the Office action it is alleged that Matsushita et al. "disclose an optical isolator having wavelength selectivity," nowhere does the Matsushita et al. set forth a structure or mechanism for an optical isolator/Faraday rotator that localizes within a magneto-optical section incident light of at least two wavelengths, wherein the magneto-optical section rotates the polarization plane of incident light of at least two wavelengths.

In contrast, claims 1 and 6 as amended now recite

> a magneto-optical *section into which at least one dielectric layer is interlaminated to create at least two magneto-optical parts* for rotating the polarization plane of incident light *of at least two wavelengths*,
>
> and

> dielectric multi-layer films in which a low refractive-index layer and a high refractive-index layer are laminated in alternation, disposed on either side of said magneto-optical section *in an arrangement predetermined to create a resonant structure for localizing within said magneto-optical section incident light of at least two wavelengths.*

Now as far as the configuration of the dielectric multi-layer films disclosed by Matsushita et al. is concerned, "the dependency of the light transmittance and the Faraday rotation angle on the number of laminations in the magneto-optical member" (paragraphs 0052, 0074) as illustrated in the Fig. 2 and 5 graphs is all that is discussed.

Nevertheless, the Office action asserts

> With particular regard to claims 2 and 7, the coupled cavity Fabry Perot structure is believed to have a response that is periodic. That is, localization and enhancement of the Farady rotation will be achieved for resonant wavelengths.

Notwithstanding claims 2 and 7 have been canceled, while the "coupled cavity Fabry Perot structure" disclosed by Matsushita et al. must by definition be periodic, it is respectfully submitted that nothing in Matsushita et al. is disclosed about tuning the cascaded dual Fabry-Perot resonators shown in Figs. 1 and 4, presumably functioning as Faraday rotators, to have at once more than one resonant wavelength. That is, nothing in Matsushita et al. is disclosed, taught or suggested to lead one skilled in the art to assume that the Matsushita et al. configuration would achieve "localization and enhancement of the Farady rotation" for any more than one resonant wavelength.

In fact, the dielectric thin film 23 in Figs. 1 and 4 of Matsushita et al., described in paragraph 0056 as likely having "a large influence on the [enhanced] light transmittance," and structurally coupling the cascaded Fabry-Perot resonators of the configuration disclosed as the inventive subject matter, as a precondition must according to the disclosure have "a predetermined optical length which is set to $\lambda/4 + m\lambda/2$ where λ is a wavelength of light and m is 0 or a positive integer" (claim 1). In other words, the optical length of the dielectric thin film 23 is pre-selected for a given wavelength.

Indeed, paragraph 0053 in Matsushita et al. discusses comparing the first-embodiment Faraday rotator 10A configuration with that of the conventional structure represented in Fig. 9, by comparing Figs. 2 and 10; and the Fig. 10 (as well as Fig. 11) graph is clearly for light of one wavelength, as stated in paragraph 0016: "The wavelength of light is 1.3 μm."

Finally, it is respectfully submitted that Faraday rotators are known conventionally to be tuned to the optimum rotation angle for incident light of one particular wavelength, and that such devices, manufactured to produce a desired degree of rotation at one wavelength,

even though they will rotate the polarization plane of light of other wavelengths, will do so at much less than the desired degree of rotation.

For the foregoing reasons, it is believed that claims 1 and 6 should be held allowable, and accordingly that claims 5 and 13, as depending from an allowable base claim 1 and 13 respectively, should no longer stand rejected over the Matsushita et al. reference.

Claim Rejections - 35 U.S.C. § 103

Claims 6, 7 and 13; Tokyo Inst. of Tech. (JP 2000-162566 A) and Official notice

Claims 6, 7 and 13 were rejected under 35 U.S.C. § 103(a) over the Tokyo Inst. of Tech. reference and in view of Official notice.

Under this rejection, it is stated that Tokyo Inst. of Tech. "disclose the invention substantially as claimed, but do not expressly disclose" the optical isolator combination that comprises "a magnetic part, a polarizer, and an analyzer." Official notice is then taken that an optical isolator essentially requires these components.

It is respectfully submitted that claim 6 in the present application has been amended to clearly distinguish over the Tokyo Inst. of Tech. reference, as discussed above in addressing the 35 U.S.C. § 102 rejections, and that based on any combination of the known subject matter of which Official notice has been taken, together with anything taught or suggested in the Tokyo Inst. of Tech. reference, a person skilled in the art could *not* be led to the present invention as now set forth in claim 6 and its pending dependent claim 13. (Claim 7 has been canceled.)

Claim 4; Tokyo Inst. of Tech. (JP 2000-162566 A) and Ricoh (JP 11-030770 A)

Claim 4 was rejected under 35 U.S.C. § 103(a) over the Tokyo Inst. of Tech. reference, in view of the Ricoh reference, in a combination that suggests the dielectric layers in a Faraday rotator can be an oxide of silicon (SiO_2) and an oxide of titanium (TiO_2).

It is believed that claim 1 should be held allowable, as discussed above in addressing the 35 U.S.C. § 102 rejections, and accordingly that claim 4 as depending from an allowable base claim 1 should no longer stand rejected, even over the Tokyo Inst. of Tech. reference in view of the Ricoh reference.

Claim 10; Tokyo Inst. of Tech. (JP 2000-162566 A), Official notice and Ricoh (JP 11-030770 A)

Claim 10 was rejected under 35 U.S.C. § 103(a) over the Tokyo Inst. of Tech. reference, in view of Official notice and further in view of the Ricoh reference, in a rejection

analogous to that made of claim 4, but taking into consideration the dependency of claim 10 on claim 6.

Likewise as stated just above in addressing the claim 10 rejection under this section, it is believed that claim 6 should be held allowable, for reasons discussed earlier, and accordingly that claim 10 as depending from an allowable base claim 6 should no longer stand rejected, even over the Tokyo Inst. of Tech. reference in view of Official notice and further in view of the Ricoh reference.

Applicants gratefully acknowledge that claims 14-17, 20 and 21 are indicated in the Office action as being allowable. Accordingly, Applicants courteously urge that this application is in condition for allowance. Reconsideration and withdrawal of the rejections is requested. Favorable action by the Examiner at an early date is solicited.

Respectfully submitted,

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